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*Technical Specification*

**3rd Generation Partnership Project;  
Technical Specification Group Services and System Aspects;  
Telecommunication management;  
Home enhanced Node B (HeNB) Subsystem (HeNS);  
Network Resource Model (NRM);  
Integration Reference Point (IRP): Information Service (IS)  
(Release 11)**

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Keywords

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OAM, HeNS, NRM

**3GPP**

Postal address

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3GPP support office address

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650 Route des Lucioles - Sophia Antipolis  
Valbonne - FRANCE  
Tel.: +33 4 92 94 42 00 Fax: +33 4 93 65 47 16

Internet

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<http://www.3gpp.org>

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## Foreword

This Technical Report has been produced by the 3<sup>rd</sup> Generation Partnership Project (3GPP).

The contents of the present document are subject to continuing work within the TSG and may change following formal TSG approval. Should the TSG modify the contents of the present document, it will be re-released by the TSG with an identifying change of release date and an increase in version number as follows:

Version x.y.z

where:

- x the first digit:
  - 1 presented to TSG for information;
  - 2 presented to TSG for approval;
  - 3 or greater indicates TSG approved document under change control.
- y the second digit is incremented for all changes of substance, i.e. technical enhancements, corrections, updates, etc.
- z the third digit is incremented when editorial only changes have been incorporated in the document.

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## Introduction

The present document is part of a TS-family covering the 3<sup>rd</sup> Generation Partnership Project Technical Specification Group Services and System Aspects, Telecommunication Management; as identified below:

- 32.781: Telecommunication management; Home eNode B Subsystem (HeNS) Network Resource Model (NRM) Integration Reference Point (IRP): Requirements
- 32.782: Telecommunication management; Home eNode B Subsystem (HeNS) Network Resource Model (NRM) Integration Reference Point (IRP): Information Service (IS)**
- 32.783: Telecommunication management; Home eNode B Subsystem (HeNS) Network Resource Model (NRM) Integration Reference Point (IRP) : Common Object Request Broker Architecture (CORBA) Solution Set (SS)
- 32.785: Telecommunication management; Home eNode B Subsystem (HeNS) Network Resource Model (NRM) Integration Reference Point (IRP): Bulk CM eXtensible Markup Language (XML) file format definition

Configuration Management (CM), in general, provides the operator with the ability to assure correct and effective operation of the 3G network as it evolves. CM actions have the objective to control and monitor the actual configuration on the Network Elements (NEs) and Network Resources (NRs), and they may be initiated by the operator or by functions in the Operations Systems (OSs) or NEs.

CM actions may be requested as part of an implementation programme (e.g. additions and deletions), as part of an optimization programme (e.g. modifications), and to maintain the overall Quality of Service (QoS). The CM actions are initiated either as single actions on single NEs of the 3G network, or as part of a complex procedure involving actions on many resources/objects in one or several NEs.

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# 1 Scope

The present document is an Integration Reference Point (IRP) named " Home enhanced Node B Subsystem (HeNS) Network Resources IRP", through which an 'IRP Agent' (typically an Element Manager or Network Element) can communicate Configuration Management information to one or several 'IRP Managers' (typically Network Managers) concerning HeNB-GW resources.

The present document specifies the protocol neutral HeNS Network Resources IRP: Network Resource Model. It reuses relevant parts of the generic NRM in 3GPP TS 32.622 [5], either by direct reuse or sub-classing, and in addition to that defines HeNB-GW specific Information Object Classes.

In order to access the information defined by this NRM, an IRP IS is needed, such as the Basic CM IRP IS (3GPP TS 32.602 [6]) or the Bulk CM IRP IS (3GPP TS 32.612 [7]). However, which IS that is applicable is outside the scope of the present document.

The present document (NRM specification) is related to the IS in 3GPP TS 32.672 [8]

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# 2 References

The following documents contain provisions which, through reference in this text, constitute provisions of the present document.

- References are either specific (identified by date of publication, edition number, version number, etc.) or non-specific.
- For a specific reference, subsequent revisions do not apply.
- For a non-specific reference, the latest version applies. In the case of a reference to a 3GPP document (including a GSM document), a non-specific reference implicitly refers to the latest version of that document *in the same Release as the present document*.

- [1] 3GPP TR 21.905: " Vocabulary for 3GPP Specifications".
- [2] 3GPP TS 32.101: "Telecommunication management; Principles and high level requirements".
- [3] 3GPP TS 32.102: "Telecommunication management; Architecture".
- [4] 3GPP TS 32.600: "Telecommunication management; Configuration Management (CM); Concept and high-level requirements".
- [5] 3GPP TS 32.622: "Telecommunication management; Configuration Management (CM); Generic network resources Integration Reference Point (IRP): Network Resource Model (NRM)".
- [6] 3GPP TS 32.602: "Telecommunication management; Configuration Management (CM); Basic Configuration Management Integration Reference Point (IRP): Information Service (IS)".
- [7] 3GPP TS 32.612: "Telecommunication management; Configuration Management (CM); Bulk CM Integration Reference Point (IRP): Information Service (IS)".
- [8] 3GPP TS 32.672: "Telecommunication management; Configuration Management (CM); State Management Integration Reference Point (IRP): Information Service (IS)".
- [9] 3GPP TS 36.300: " Evolved Universal Terrestrial Radio Access (E-UTRA), Evolved Universal Terrestrial Radio Access Network (E-UTRAN); Overall description; stage 2"
- [10] 3GPP TS 32.593: "Home eNode B (HeNB) Operations, Administration, Maintenance and Provisioning (OAM&P); Procedure flows for Type 1 Interface HeNB to HeNB Management System (HeMS)"
- [11] 3GPP TS 32.300: "Telecommunication management; Configuration Management (CM); Name convention for Managed Objects"

- [12] 3GPP TS 32.111-2: "Telecommunication management; Fault Management; Part 2: Alarm Integration Reference Point (IRP): Information Service (IS)".
- [13] 3GPP TS 32.752: "Telecommunication management; Evolved Packet Core (EPC) Network Resource Model (NRM) Integration Reference Point (IRP): Information Service (IS)".
- [14] 3GPP TS 32.772: "Telecommunication management; Home Node B Subsystem (HNS) Network Resource Model (NRM) Integration Reference Point (IRP); Information Service (IS)".

## 3 Definitions and abbreviations

### 3.1 Definitions

For the purposes of the present document, the following terms and definitions apply. For terms and definitions not found here, please refer to 3GPP TR 21.905 [1], TS 32.101 [2], 3GPP TS 32.102 [3] and 3GPP TS 32.600 [4].

**Association:** In general it is used to model relationships between Managed Objects. Associations can be implemented in several ways, such as:

- (1) name bindings;
- (2) reference attributes; and
- (3) association objects.

This IRP stipulates that containment associations shall be expressed through name bindings, but it does not stipulate the implementation for other types of associations as a general rule. These are specified as separate entities in the object models (UML diagrams).

**Managed Element (ME):** an instance of the Information Object Class `ManagedElement` defined in 3GPP TS 32.622 [5].

**Managed Object (MO):** in the context of the present document, a Managed Object (MO) is a software object that encapsulates the manageable characteristics and behaviour of a particular Network Resource. The MO is instance of a MO class defined in a MIM/NRM. This class, called **Information Object Class (IOC)** has *attributes* that provide information used to characterize the objects that belong to the class (the term "attribute" is taken from TMN and corresponds to a "property" according to CIM). Furthermore, the IOC can have *operations* that represent the behaviour relevant for that class (the term "operation" is taken from TMN and corresponds to a "method" according to CIM). The IOC may support the emission of *notifications* that provide information about an event occurrence within a network resource.

**Management Information Model (MIM):** also referred to as NRM - see the definition below.

**Network Resource Model (NRM):** a model representing the actual managed telecommunications network resources that a System is providing through the subject IRP

An NRM identifies and describes IOCs, their associations, attributes and operations. The NRM is also referred to as "MIM" (see above), which originates from the ITU-T TMN.

### 3.2 Abbreviations

For the purposes of the present document, the following abbreviations apply:

GW	Gateway
HeNB	Home enhanced Node B
HeNS	Home enhanced Node B Subsystem
IOCs	Information Object Classes

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## 4 System Overview

### 4.1 Compliance rules

The following defines the meaning of Mandatory and Optional IOC attributes and associations between IOCs, in Solution Sets to the IRP defined by the present document:

- The IRPManager shall support all mandatory attributes/associations. The IRPManager shall be prepared to receive information related to mandatory as well as optional attributes/associations without failure; however the IRPManager does not have to support handling of the optional attributes/associations.
- The IRPAgent shall support all mandatory attributes/associations. It may support optional attributes/associations.

An IRPAgent that incorporates vendor-specific extensions shall support normal communication with a 3GPP SA5-compliant IRPManager with respect to all Mandatory and Optional information object classes, attributes and associations without requiring the IRPManager to have any knowledge of the extensions.

Given that

- rules for vendor-specific extensions remain to be fully specified, and
- many scenarios under which IRPManager and IRPAgent interwork may exist,

it is recognised that the IRPManager, even though it is not required to have knowledge of vendor-specific extensions, may be required to be implemented with an awareness that extensions can exist and behave accordingly.

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## 5 Modelling approach

The modelling approach adopted and used in this IRP is described in TS 32.622 [5].

It should be noted that this model allows for combined Managed Element functionality, where more than one 'function IOCs' (inherited from ManagedFunction) modelling more specific managed element functionality may be contained in the ManagedElement IOC.

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## 6 Information Object Classes

### 6.1 Information entities imported and local labels

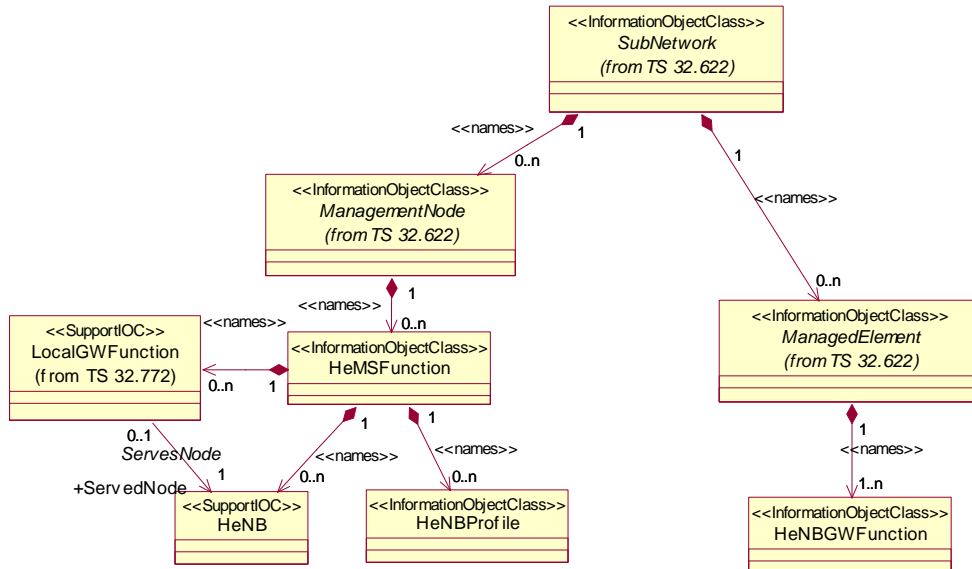
Label reference	Local label
3GPP TS 32.622 [5], IOC, ManagedElement	ManagedElement
3GPP TS 32.622 [5], IOC, ManagedFunction	ManagedFunction
3GPP TS 32.622 [5], IOC, MeContext	MeContext
3GPP TS 32.622 [5], IOC, SubNetwork	SubNetwork
3GPP TS 32.622 [5], IOC, Top	Top
3GPP TS 32.622 [5], IOC, VsDataContainer	VsDataContainer
3GPP TS 32.622 [5], IOC, ManagementNode	ManagementNode
3GPP TS 32.752 [13], IOC, EP_RP_EPS	EP_RP_EPS
3GPP TS 32.772 [14], IOC, LocalGWFunction	LocalGWFunction

## 6.2 Class diagram

### 6.2.1 Attributes and relationships

This clause depicts the set of IOCs that encapsulate information relevant for this service. This clause provides the overview of all information object classes in UML. Subsequent clauses provide more detailed specification of various aspects of these information object classes.

The figure 1 shows the containment/naming hierarchy and the associations of the information object classes, when HeNB GW is present in HeNS.



NOTE 1: The listed cardinality numbers, in particular the use of cardinality number zero, do not represent transient states. The transient state is considered an inherent property of all IOC instances and therefore there is no need to represent them by individual IOC cardinality numbers.

Figure 1: HeNS NRM Containment/Naming and Association diagram\_1

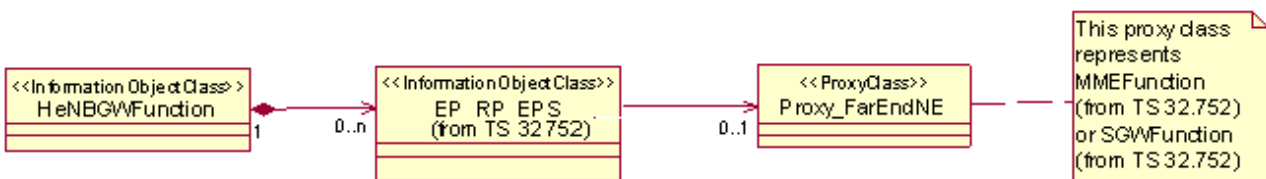
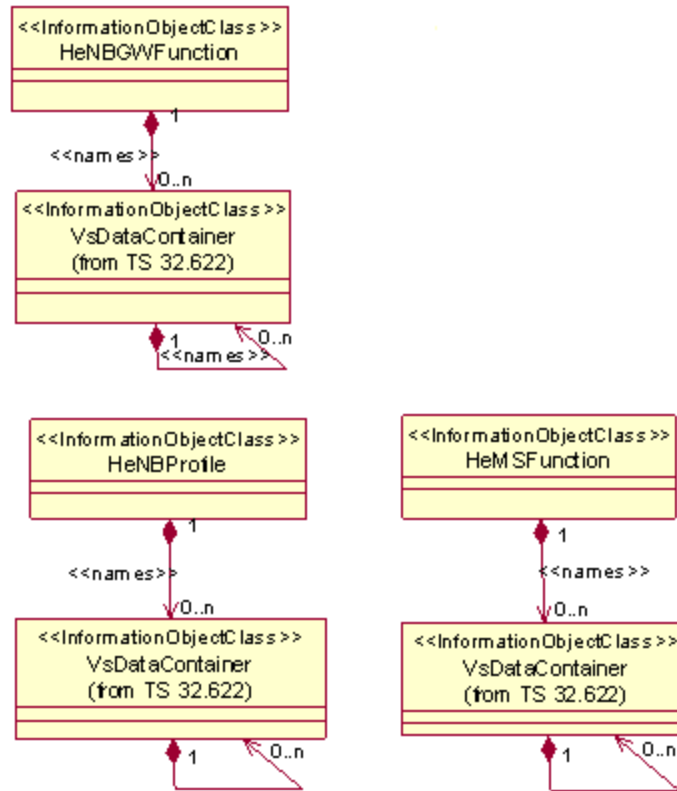


Figure 2: HeNS NRM Containment/Naming and Association diagram\_2





NOTE 1: The listed cardinality numbers, in particular the use of cardinality number zero, do not represent transient states. The transient state is considered an inherent property of all IOC instances and therefore there is no need to represent them by individual IOC cardinality numbers.

NOTE 2: Each instance of the `VsDataContainer` shall only be contained under one IOC. The `VsDataContainer` can be contained under IOCs defined in other NRMs.

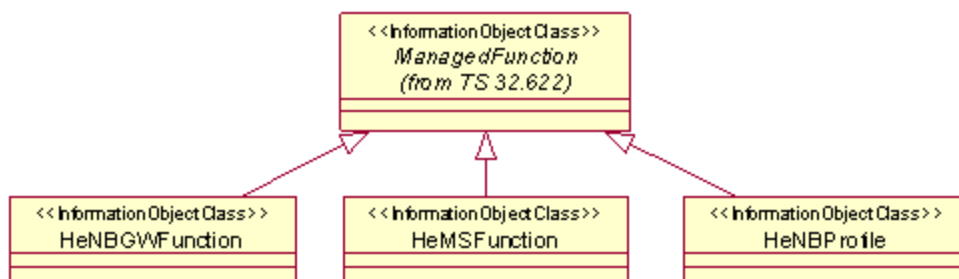
**Figure 3: VsDataContainer Containment/Naming and Association**

The `VsDataContainer` is only used for the Bulk CM IRP.

Each IOC is identified with a Distinguished Name (DN) according to 3GPP TS 32.300 [11] that expresses its containment

## 6.2.2 Inheritance

This clause depicts the inheritance relationships that exist between IOCs.



**Figure 4: HeNS NRM Inheritance Hierarchy**

## 6.3 Information object class definitions

### 6.3.1 HeNBGWFunction

#### 6.3.1.1 Definition

This IOC represents HeNB GW functionality. A HeNB GW is optional in a HeNB subsystem. This IOC is only effective when HeNB GW is included in HeNS. For more information about the HeNB GW, see 3GPP TS 36.300[9]

#### 6.3.1.2 Attributes

**Attributes of HeNBGWFunction**

Attribute name	Support Qualifier	Read Qualifier	Write Qualifier
Id	M	M	-
henbGwId	M	M	-
iPConfigInfo	M	M	-
maxNbrHeNBRegistered	M	M	-
maxPacketCapability	M	M	-

#### 6.3.1.3 Notifications

See clause 6.6 Alarm and configuration notifications.

### 6.3.2 HeMSFunction

#### 6.3.2.1 Definition

This IOC represents HeMS functionality. For more information about HeMS, see 3GPP TS 32.593[10].

#### 6.3.2.2 Attributes

There are no attributes (other than those inherited).

#### 6.3.2.3 Notifications

There are no Notifications (other than those inherited).

### 6.3.3 HeNBProfile

#### 6.3.3.1 Definition

The `HeNBProfile` is a representation of information that a) identifies a specific set of HeNB devices and b) the related configuration parameters (and their values) that are required to be configured in those identified HeNB devices during HeNB registration procedure [10].

It contains `userLabel`, an attribute inherited from `ManagedFunction`. This is a user friendly label assigned by operator. Examples can be “VIP configuration”, “Gold Tier configuration”, “device vendor XYZ software version 3.4”, “camel”, etc

### 6.3.3.2 Attributes

#### Attributes of HeNBProfile

Attribute name	Support Qualifier	Read Qualifier	Write Qualifier
Id	M	M	--
Configuration	M	M	--
Criterion	O	M	--

### 6.3.3.3 Notifications

There are no Notifications (other than those inherited).

## 6.3.4 HeNB

### 6.3.4.1 Definition

This SupportIOC represents HeNB functionality. For more information about the HeNB, see 3GPP TS 36.300 [9].

The Home eNodeB, represented by the <<SupportIOC>> HeNB, has registered itself with one node represented by HeMSFunction.

### 6.3.4.2 Attributes

#### Attributes of HeNB

Attribute name	Support Qualifier	Read Qualifier	Write Qualifier
Id	M	--	-

### 6.3.4.3 Notifications

Name	Qualifier	Notes
notifyAckStateChanged	See Alarm IRP (3GPP TS 32.111-2 [12])	
notifyChangedAlarm	See Alarm IRP (3GPP TS 32.111-2 [12])	
notifyClearedAlarm	See Alarm IRP (3GPP TS 32.111-2 [12])	
notifyNewAlarm	See Alarm IRP (3GPP TS 32.111-2 [12])	

## 6.4 Information relationship definitions

## 6.5 Information attribute definitions

### 6.5.1 Definition and legal values

Table 6.5.1.1 defines the attributes that are present in several Information Object Classes (IOCs) of the present document.

**Table 6.5.1.1: Attributes definitions and legal values**

Attribute Name	Definition	Legal Values
id	An attribute whose 'name+value' can be used as an RDN when naming an instance of the IOC. This RDN uniquely identifies the object instance within the scope of its containing (parent) object instance.	
heNBgwId	Unique HeNB GW ID. Ref. 3GPP TS 36.300 [9] specifies that HeNB GW acts as a concentrated node to the existing EPC network using existing S1 interface.	
ipConfigInfo	The IP address, subnetwork mask, default gateway for HeNB GW.	
maxNbrHeNBRegistered	Maximum number of registered HeNB means maximum number of HeNB allowed to be registered.	
maxPacketCapability	The HeNB GW's ability of forwarding packets, such as maximum number of forwarded packets per second.	
farEndNeIpAddr	The IP address(s) of the far end network entity to which the reference point is related. This is an IPv4 or an IPv6 address.	
configuration	It is a location of a data set. The data set is a set of HeNB attributes (with values) needed to be loaded into the HeNB.  The data set does not contain all configuration data needed for a device to operate. Some configuration parameters are autonomously and dynamically calculated by the serving HeMS.	

<p>crit<sub>erion</sub></p>	<p>It is a criterion that determines if a HeNB should or should not be loaded with a particular configuration.</p> <p>The syntax and semantics of <code>crit<sub>erion</sub></code> is vendor-specific.</p> <p>Example 1:</p> <p>The syntax and semantics can be “If the HeNB ID range is between ABC and DEF then APPLY the related configuration”.</p> <p>Example 2:</p> <p>The syntax is a list of strings where each string is a “attribute = value” pair. An attribute represents a TR-196 parameter. Its value is the corresponding attribute value.</p> <p>The semantics is “if all pairs found in <code>crit<sub>erion</sub></code> are also found in the home devices, then the determination is positive in that the home device should be loaded with information of the data set identified by <code>configuration</code>; else not”.</p>	
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## 6.5.2 Constraints

None.

## 6.6 Common Notifications

Name	Qualifier	Notes
notifyAckStateChanged	See Alarm IRP (3GPP TS 32.111-2 [12])	
notifyAttributeValueChange	O	
notifyChangedAlarm	See Alarm IRP (3GPP TS 32.111-2 [12])	
notifyClearedAlarm	See Alarm IRP (3GPP TS 32.111-2 [12])	
notifyNewAlarm	See Alarm IRP (3GPP TS 32.111-2 [12])	
notifyObjectCreation	O	
notifyObjectDeletion	O	
notifyComments	See Alarm IRP (3GPP TS 32.111-2 [12])	

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## Annex A (informative): Change history

Change history							
Date	TSG #	TSG Doc.	CR	Rev	Subject/Comment	Old	New
Mar 2010	SA#47	SP-100063	--	--	Presentation to SA for information and approval	--	1.0.0
Mar 2010	--	--	--	--	Publication of SA approved version	1.0.0	9.0.0
Jun 2010	SA#48	SP-100264	001	--	Remove the superfluous relationship of EP_RP_EPS	9.1.0	10.0.0
Mar 2011	SA#51	SP-110099	002	2	Add localGWFunction IOC	10.0.0	10.1.0
2012-09	-	-	-	-	Update to Rel-11 version (MCC)	10.1.0	<b>11.0.0</b>